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*Goheen*

CARBONIZING COATING  
PROTECTION

FRANKLIN  
INSTITUTE  
LIBRARY

**"Hitch your wagon  
to a star"**











## PREFATORY.

THE PARTICULAR STAR that we would direct the reader to is a protective agent for Iron and Steel structures from the ravages of Rust and Corrosion. The problem of protecting important Steel structures is by no means solved, and an increasingly widening field is open for further experiment and research.

The subject of the protection of Iron and Steel, and the manufacture of successful protective paint, demands more chemical knowledge and technical detail than can be given by the average paint manufacturer; it is, in fact, a complete specialty.

We are great believers of "a small farm well tilled," and have for years given our sole attention to this work, digging deeply into the causes and effects of corrosive action of gases, atmospheric influences, the effects of sudden changes of temperature and other influences arising from natural and manufacturing sources.

In our product, Carbonizing Coating, we have a protective paint that will withstand to a greater degree the vicissitudes of actual service under all classes of conditions than will Red Lead, Graphite or structural paints generally. We do not base our guarantee on theoretical calculations, but on actual practice; time has verified all our claims for Carbonizing Coating.

Progressive Engineers, Architects and large paint consumers are reaching out for something better, something more reliable; something, that while it may not solve completely the great problem of protecting Iron and Steel from rust and decay, will at least give longer protection (at no greater cost) than is afforded by Red Lead, Graphite, Oxide of Iron and other paints of a similar character; to them we invite the careful perusal of the following pages, and to carefully note the universally satisfactory results in preserving Iron and Steel with Carbonizing Coating.

Carbonizing Coating is made *only* by

THE GOHEEN MANUFACTURING COMPANY,

EXPORT OFFICE:

Canton, Ohio, U. S. A.

18 Billiter Street, London, E. C., England.

*Correspondence invited in all languages.*





1—Pontiac Building.  
 2—Champlain Building.  
 3—Monadnock Block.  
 4—Masonic Temple.

Group of modern buildings, upon which Carbonizing Coating was used to protect the exposed Iron and Steel work from Rust and Corrosion.



## LINSEED OIL.

**I**N PAINT MAKING there is no substitute for Linseed Oil; it has been sometimes alluded to as "the life" of paint, but in reality it is that portion that first becomes disintegrated and decays.

Linseed Oil alone is no protection for metal surfaces; it dries with a porous film, absorbing moisture, admitting of oxidization. But chemically pure prepared Linseed Oil, combined with proper pigments, gives the most lasting and efficient paint covering made for Iron and Steel construction.

There is only one oil known that ranks higher in the art of paint making than Linseed Oil, viz, Japanese, or, as it is sometimes called, Tung Oil, which when dry is absolutely waterproof and weatherproof. To this oil the Japanese and Chinese owe much of their success in Lacquer, Varnish and Paint making, which they have carried on for ages. The cost and small production of this oil, however, precludes it as a paint vehicle in this country.

Oil entering into a protective coating must be absolutely pure, pressed from ripe seed and from flax which is cultivated for the seed and not for the fiber. Unfortunately, the most of the flax raised in this country is raised for the fiber, and the major portion of seed is never allowed to ripen. Oil made from unripe seed is totally unfit for use in successful protective coating for Iron and Steel construction. The seed should be at least six months old before pressing, and the oil "aged" and "settled." Oil pressed from unripe seed or flax which is raised entirely for the fiber, yields on an average about ten per cent of water. It is from this character of flax that the bulk of our "Commercially Pure Linseed Oil" is pressed.

It will be seen, therefore, that the ordinary Pure Linseed Oil of commerce is not adapted to protective paints; the oil of commerce must be treated—freed from water, glutinous substances known as muscovites, and other contaminations, before it can be used in preservative paint, where reliable and uniform results are expected.

There are two hundred and ninety-three non-drying oils which are available for adulteration of Linseed Oil, and to which might be added eighty animal and fish oils; these unfortunately are frequently mixed with the Pure Linseed Oil of commerce, and experts alone can detect their presence.

It is apparent to what extent these adulterants are used when we stop to consider that the world's total supply of Linseed Oil is something like 250,000,000 gallons, while the demand is 400,000,000 gallons.

Cottonseed Oil, Poppyseed Oil, Rosin Oil, Rapeseed Oil, Colza and Lucca Oil are frequently used as adulterants of Linseed Oil, and we might remark that the non-uniform results obtained from many paints are the results of the presence of these oils, rather than the fault of the pigments used.

In preparing "Carbonizing Coating," we "hitch our wagon to the highest star," and prepare our oil, not trusting commercially pure oil, but working only with a product that is chemically pure, knowing that the paint maker's success in producing an absolutely reliable and successful protective coating depends on the purity of the material used.





*Mt. Royal Pumping Station, Baltimore, Md.  
Henry Braums, Consulting Engineer, Baltimore, Md.*

CHARLOTTETOWN, P. E. I., CAN., FEB. 8, 1898.

*The Goheen Mfg. Co., Canton, Ohio.*

GENTLEMEN:—Your favor of January 31st, 1898, duly to hand. The best test that we have put the Carbonizing Coating to is one on the roof of the retort house of the Gas Company here, the covering which has always been attacked by the sulphur fumes from the gas. In putting on the plates a part of one was used which had scarcely any coating on it, and this is now rusted; but all the rest which was coated properly is without any sign of rust or effect from sulphur. For a sulphur test we think there could hardly be any thing more severe than this in actual use. Carbonizing Coating is all right, and it is surprising how effective it is when put on in the proper

Very truly yours,  
HENRY R. LORDLY, Chief Engineer.

TELEPHONE :  
6207 CORTLANDT

CABLE ADDRESS :  
"OSTICER" NEW YORK  
A. B. C. AND LIEBER CODES

**Oliver S. Ticer,**

*Contractor and Manufacturers' Export Agent.  
Finished Iron and Steel  
in all Stages, Grades and Qualities.*

39-41 CORTLANDT ST., J. MONROE TAYLOR BLDG.

NEW YORK, MARCH 12, 1901.

*The Goheen Mfg. Co., No. 253 Broadway, City.*

GENTLEMEN:—I have used your Carbonizing Coating quite extensively on Riveted Steel Water Pipe and am thoroughly satisfied and pleased with the results thereof.

It is undoubtedly the best coating that I have yet found in several years' experience and much experimenting for this purpose.

The pipe upon which I have used it has in almost every case been buried under ground, and if the coating was in any way unsatisfactory I would certainly have had complaints from my clients, but I am happy to say that I have never yet received a word of complaint.

I have used the coating for both export and domestic use, where the pipe has had exceedingly rough handling in transit, and with the results above stated.

Very truly yours,  
O. S. TICER.



*Pipe Line on Pike's Peak, Colorado.  
Protected by Carbonizing Coating.*



## PREPARATORY TO PAINTING IT IS ESSENTIAL TO DO SOME CLEANING.

THE PROPER APPLICATION of a preservative paint is a most essential feature. Some paints and coatings are flowed on; others should be brushed out vigorously to a thin, even coat, and to this class belongs "Carbonizing Coating."

Cleanliness of the metal before applying a protective coating is absolutely essential, and is a most important primary factor towards preservation. When we say clean, we mean free from moisture, dirt, shop grease, flash scale and rust. Shop grease can be removed by repeated applications of benzine or lye water and afterwards cleansed with warm water and dried with cloths, or by the aid of heat. Rust and flash scale may be removed successfully by the sand blast, or with steel brushes and scrapers, and by "pickling." Deep-seated rust spots should have heat applied to them, the usual method being the use of an ordinary painter's torch; this converts the rust into a new body, viz, Peroxide of Iron, which is easily removed by simply dusting off from the surface to be painted.

Too little attention is given to the cleaning of Iron and Steel before being coated. It is imperative, to obtain the highest results, that the cleaning should be thorough. Here is a sample of an inspector's report on the cleaning of construction work prior to painting:

"The removal of the rust spots and mill scale was being done by putty knives and whisk brooms. Steel brushes were also used (evidently a minor appendage to the brooms). If there was anything unusual in this method of cleaning at the shops, it was on the side of thoroughness. After cleaning, the plates *still* showed thin yellow rust spots, and these showed plainly, but of a darker color, after the Oil Coating was applied."

Nothing but imperfect results could be attained from slipshod cleaning as above noted.

In painting old surfaces, where the paint is badly scaled, all loose paint should be removed either with the sand blast, careful use of steel brushes or an application of paint remover, cleansing and drying thoroughly before painting.

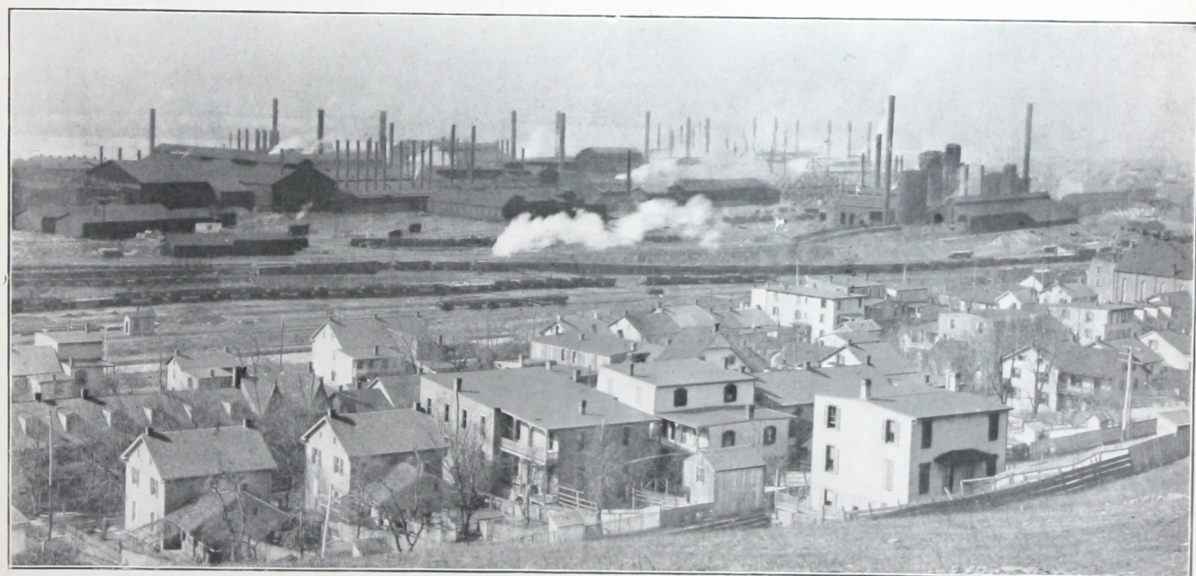
No preservative coating, let it be Red Lead, Oxide of Iron, Graphite or any other paint made, will adhere, protect and preserve on a surface that is wet, greasy and rusty at the time of applying the coating.

Engineers and Architects are paying much more attention to the matter of "clean surface before painting" than they have in the past, and are well repaid by obtaining the maximum protection from the various coatings used.





*Colorado Fuel and Iron Company's Plant.*



*Pennsylvania Steel Company's Plant.*

Carbonizing Coating protects Iron and Steel work in the plants shown above.



# THE DURABILITY AND COVERING CAPACITY OF VARIOUS PROTECTIVE PAINTS.

**T**OO FREQUENTLY Protective Paints are bought without any regard to their real economy, viz, the covering capacity and durability. The following table is compiled from actual practice, and demonstrates that the first cost does not govern the real economy of rustless coatings:

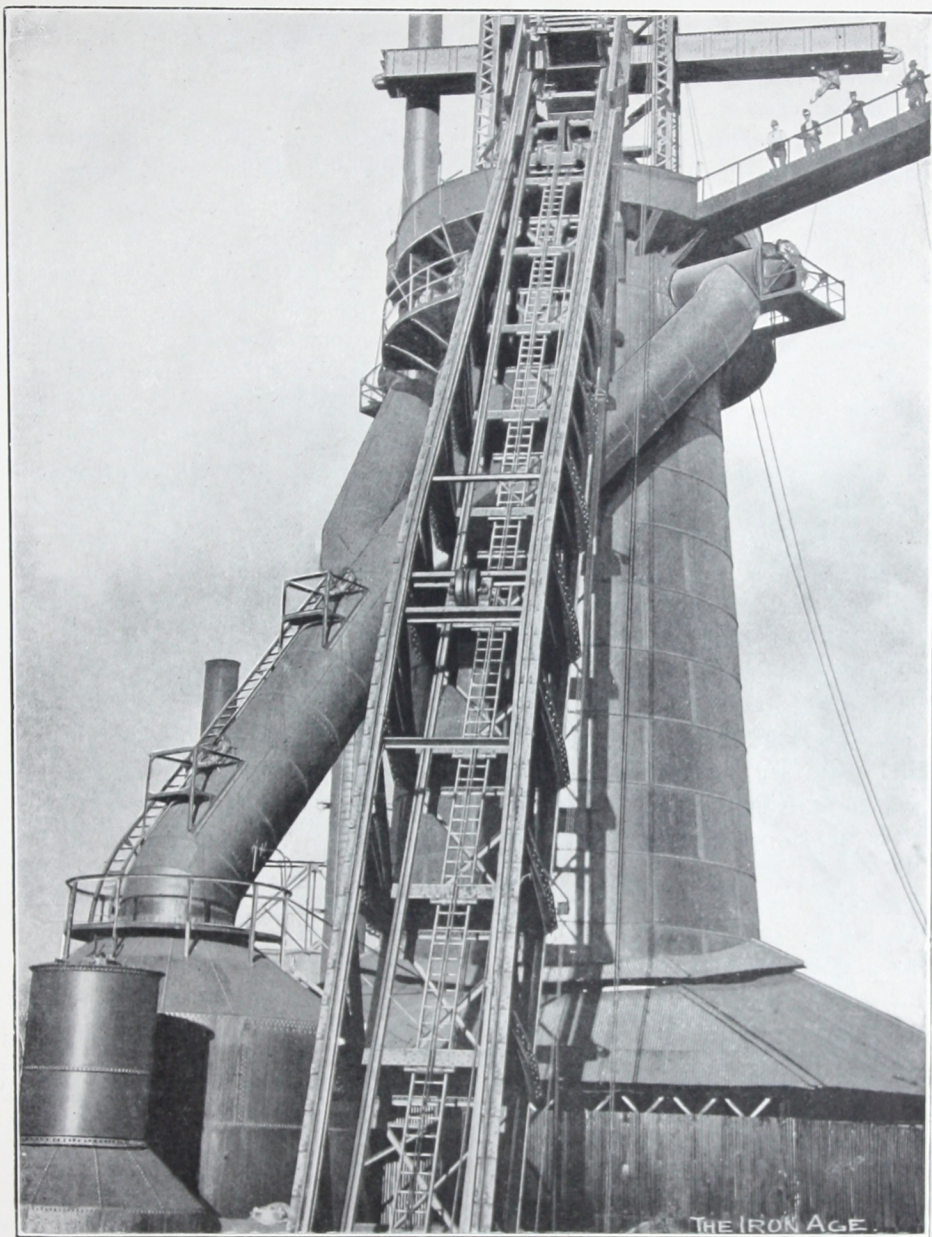
**PAINT TABLE.**

| STRUCTURE  | SPAN<br>IN<br>FEET | WEIGHT<br>IN<br>POUNDS | AREA<br>IN<br>SQ. FT. | GALLONS PAINT REQUIRED 1ST AND 2ND COATS! |                |                |                |                |                |                |                |                |                |                             |                | CARBONIZING<br>COATING   |      |  |
|--|--------------------|------------------------|-----------------------|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------------------|----------------|--|------|--|
|  |                    |                        |                       | IRON<br>OXIDE                             |                | RED<br>LEAD    |                | WHITE<br>LEAD  |                | GRAPHITE       |                | ASPHALT        |                | CARBON-<br>IZING<br>COATING |                | GALLONS PER<br>100 LBS.<br>OF BRIDGE   |      | COST<br>PER 100<br>LBS. OF<br>BRIDGE,<br>2 COATS |
|  |                    |                        |                       | 1ST                                       | 2ND            | 1ST            | 2ND            | 1ST            | 2ND            | 1ST            | 2ND            | 1ST            | 2ND            | 1ST                         | 2ND            | 1ST  | 2ND  |  |
|  |                    |                        |                       |   |                |                |                |                |                |                |                |                |                |                             |                |  |      |  |
| <i>Highway Bridge,<br/>16 feet by 90 feet</i>          | 20                 | 1800                   | 400                   | 1   | $3\frac{3}{4}$ | $3\frac{3}{4}$ | $1\frac{1}{2}$ | 1              | $3\frac{3}{4}$ | 1              | $3\frac{3}{4}$ | $1\frac{1}{2}$ | 1              | $1\frac{1}{2}$              | $1\frac{1}{2}$ | .028   | .028 | \$0.08   |
|  | 40                 | 5200                   | 800                   | $1\frac{1}{2}$                            | $1\frac{1}{4}$ | $1\frac{1}{4}$ |                | $1\frac{1}{2}$ | $1\frac{1}{4}$ | $1\frac{1}{2}$ | $1\frac{1}{4}$ | 3              | $1\frac{1}{2}$ | $3\frac{3}{4}$              | $1\frac{1}{2}$ | .015   | .010 | 0.04   |
|  | 60                 | 10200                  | 1400                  | 3   | 2              | 2              | $1\frac{1}{2}$ | 3              | 2              | 3              | 2              | 5              | 3              | $1\frac{1}{2}$              | 1              | .015   | .010 | 0.04   |
|  | 80                 | 16800                  | 2200                  | $4\frac{1}{2}$                            | 3              | 3              | $2\frac{1}{2}$ | $4\frac{1}{2}$ | 3              | $4\frac{1}{2}$ | 3              | 7              | $4\frac{1}{2}$ | $2\frac{1}{2}$              | $1\frac{1}{2}$ | .013   | .009 | 0.03   |
|  | 100                | 25000                  | 3000                  | 6   | $4\frac{1}{2}$ | $4\frac{1}{2}$ | 3              | 6              | $4\frac{1}{2}$ | 6              | $4\frac{1}{2}$ | 10             | 6              | 3                           | 2              | .012   | .008 | 0.03   |
|  | 120                | 34800                  | 3800                  | $7\frac{1}{2}$                            | $5\frac{1}{2}$ | $5\frac{1}{2}$ | 4              | $7\frac{1}{2}$ | $5\frac{1}{2}$ | $7\frac{1}{2}$ | $5\frac{1}{2}$ | 13             | $7\frac{1}{2}$ | $3\frac{3}{4}$              | $2\frac{1}{2}$ | .011   | .007 | 0.03   |
|  | 140                | 46200                  | 5400                  | 11  | 8              | 8              | $5\frac{1}{2}$ | 11             | 8              | 11             | 8              | 18             | 11             | $5\frac{1}{2}$              | $3\frac{3}{4}$ | .012   | .008 | 0.03   |
|  | 160                | 59200                  | 8000                  | 16  | 12             | 12             | 8              | 16             | 12             | 16             | 12             | 27             | 16             | 8                           | $5\frac{1}{2}$ | .013   | .009 | 0.03   |
|  | 180                | 73800                  | 10000                 | 20  | 14             | 14             | 10             | 20             | 14             | 20             | 14             | 33             | 20             | 10                          | 7              | .013   | .009 | 0.03   |
|  | 200                | 90000                  | 12000                 | 24  | 17             | 17             | 12             | 24             | 17             | 24             | 17             | 40             | 24             | 12                          | 8              | .013   | .009 | 0.03   |
|  | 220                | 107800                 | 15000                 | 30  | 21             | 21             | 15             | 30             | 21             | 30             | 21             | 50             | 30             | 15                          | 10             | .014   | .009 | 0.03   |
|  | 240                | 127200                 | 18000                 | 36  | 25             | 25             | 18             | 36             | 25             | 36             | 25             | 60             | 36             | 18                          | 12             | .014   | .009 | 0.03   |
|  | 260                | 148200                 | 21000                 | 42  | 30             | 30             | 21             | 42             | 30             | 42             | 30             | 70             | 42             | 21                          | 14             | .014   | .009 | 0.03   |
|  | 280                | 170800                 | 24000                 | 48  | 35             | 35             | 24             | 48             | 35             | 48             | 35             | 80             | 48             | 24                          | 16             | .014   | .009 | 0.03   |
|  | 300                | 195000                 | 28000                 | 56  | 40             | 40             | 28             | 56             | 40             | 56             | 40             | 90             | 56             | 28                          | 19             | .014   | .009 | 0.03   |
| <i>Single Track<br/>Railway Bridge</i>                 | 80                 | 60000                  | 4800                  | 10  | 7              | 7              | 5              | 10             | 7              | 10             | 7              | 16             | 10             | 5                           | 3              | .008   | .005 | 0.02   |
|  | 100                | 85000                  | 6800                  | 14  | 10             | 10             | 7              | 14             | 10             | 14             | 10             | 23             | 14             | 7                           | 5              | .008   | .005 | 0.02   |
|  | 120                | 112000                 | 8960                  | 18  | 13             | 13             | 9              | 18             | 13             | 18             | 13             | 29             | 18             | 9                           | 6              | .008   | .005 | 0.02   |
|  | 140                | 150000                 | 12000                 | 24  | 17             | 17             | 12             | 24             | 17             | 24             | 17             | 40             | 24             | 12                          | 8              | .008   | .005 | 0.02   |
|  | 160                | 185000                 | 15000                 | 30  | 21             | 21             | 15             | 30             | 21             | 30             | 21             | 50             | 30             | 15                          | 10             | .008   | .005 | 0.02   |
|  | 180                | 226000                 | 18080                 | 36  | 26             | 26             | 18             | 36             | 26             | 36             | 26             | 60             | 36             | 18                          | 12             | .008   | .005 | 0.02   |
|  | 200                | 270000                 | 21600                 | 43  | 31             | 31             | 22             | 43             | 31             | 43             | 31             | 72             | 43             | 22                          | 14             | .008   | .005 | 0.02   |
|  | 220                | 319000                 | 25520                 | 51  | 36             | 36             | 25             | 51             | 36             | 51             | 36             | 85             | 51             | 25                          | 17             | .008   | .005 | 0.02   |
|  | 240                | 375000                 | 30000                 | 60  | 43             | 43             | 30             | 60             | 43             | 60             | 43             | 100            | 60             | 30                          | 20             | .008   | .005 | 0.02   |
|  | 260                | 429000                 | 34320                 | 69  | 49             | 49             | 35             | 69             | 49             | 69             | 49             | 115            | 69             | 35                          | 23             | .008   | .005 | 0.02   |
|  | 280                | 490000                 | 39200                 | 78  | 56             | 56             | 39             | 78             | 56             | 78             | 56             | 130            | 78             | 39                          | 26             | .008   | .005 | 0.02   |
|  | 300                | 555000                 | 44500                 | 89  | 63             | 63             | 45             | 89             | 63             | 89             | 63             | 148            | 89             | 45                          | 30             | .008   | .005 | 0.02   |
| Covering Capacity of 1 Gal-<br>lon in Square Feet..... |                    |                        |                       | 500                                       | 700            | 700            | 1000           | 500            | 700            | 500            | 700            | 300            | 500            | 1000                        | 1500           | NOTE—Area cov-<br>ered by one gallon<br>is for finely ground<br>Pigment, such as<br>Carbonizing Coating<br>or Magnetic Reds<br>and Browns. |      |  |
| Price per Gallon.....                                  |                    |                        |                       | \$ .50                                    |                | 1.25           | .85            | .70            | .40            | .70            | .40            | .30            | .50            | 1.50                        |                |  |      |  |
| Cost per 100 Square Feet....                           |                    |                        |                       | .10                                       | .07            | .18            | .13            | .17            | .12            | .14            | .10            | .13            | .08            | .15                         | .10            |  |      |  |
| Times Renewed in 20 Years.                             |                    |                        |                       | 10  |                | 3              |                | 5              |                | 7              |                | 60             |                | 1                           |                |  |      |  |
| Cost per 100 Square Feet for<br>20 Years.....          |                    |                        |                       | \$1.70                                    |                | 0.92           |                | 1.45           |                | 1.68           |                | 12.60          |                | 0.25                        |                |  |      |  |
| Relative Economic Value on<br>20-Year Basis.....       |                    |                        |                       | 68  |                | 38             |                | 58             |                | 67             |                | 5              |                | 100                         |                |  |      |  |

**BUILDINGS.**—12 pounds iron averages 1 square foot surface=1 square foot floor surface. Add ten per cent. for corrugations in corrugated iron.

**STEEL RIVETED PIPE.**—Number of gallons of Carbonizing Coating per lineal foot of pipe equals sum of inside and outside diameters in inches multiplied by 0.000262 for first coat and by 0.000174 for second coat and succeeding coats. Add three per cent. for laps.





*The Colorado Fuel and Iron Company's Plant.  
Showing the Cupola of One Blast Furnace.*

Blast Furnace Construction can be protected by Carbonizing Coating for a longer period than is afforded by ordinary paints.



## RED LEAD AS A PROTECTIVE PAINT

HAS BEEN LARGELY SPECIFIED on structural iron work, most frequently as a first coat, finishing the work with one or two coats of Oxide of Iron, Graphite or other paints. The fact has been practically and chemically demonstrated that the use of pigments of high specific gravity (such as Red Lead) in first coating are entirely wrong, and that pigments of low specific gravity are the most satisfactory for primary coating of metal. This conclusion has been reached after the most elaborate experiment and research by SPENRATH, the noted French Technical Chemist, and many other equally high authorities on the problem of preservation of iron and steel.

At the same time, it has developed that many pigments of extremely low specific gravities are not altogether suited for the first coatings. Red Lead dries too rapidly and hard, (at the expense of the oil) becoming brittle, and does not allow for the expansion and contraction of the metal; hence cracks appear on the surface, in consequence rusting takes place. There is no pigment we know of within the category of rustless coating pigments, which has such a marked effect upon the oil or binding material. Red Lead is easily attacked by gases generated from decaying vegetable matter and the combustion of coal. Sulphurated hydrogen or locomotive smoke rapidly changes the color of Red Lead *and alters the chemical composition*, disintegrating the paint, causing it to crumble; the result being no longer a rustless coating upon the surface of the metal.

Many mixtures of various pigments with Red Lead have been tried to retard the hard, rapid drying of Red Lead paint, such as "Red Lead and Lampblack," "Red Lead and Yellow Ochre," and many others, but have failed to produce the results desired; especially is this the case in the use of Ochre with Red Lead, for the simple reason that Yellow Ochre contains in its composition moisture, which, while retarding the rapid drying of the Red Lead paint and lending more elasticity to it, (the moisture therein contained under many conditions is freed from the Ochre) is most detrimental to the metal covered with it; in fact, aiding the formation of rust and corrosion under the surface of the paint upon the metal.

The specific gravity of a rustless coating has doubtless a great deal to do with the durability of the covering. In many cases we find Engineers specifying Red Lead paint, "*not to weigh less than thirty pounds to the gallon*," to be used upon their work, while others specify Graphite paint made up of two pounds dry Graphite and one gallon Linseed Oil, the finished paint weighing about nine pounds to the gallon. In the first instance, the weight of the pigment predominates to such an extent that we would consider it of very little value as a protective paint, while on the other hand, in the Graphite paint, the weight of the oil or binding material predominates. A paint for IRON and STEEL *must be so balanced as to give the desired protection*. In the case of Red Lead, the requisite amount of oil or binding material cannot be used, owing to the high gravity of the lead, and produce a desirable coating. Indeed, in most of the cheap paints now offered, the pigment is much greater than the binding material, and just to the extent the pigment predominates over the oil, is the life, durability and usefulness of the coating curtailed.

The cost of Red Lead and the difficulty of applying it, as compared with other just as efficient and durable paints, is reducing its use daily as a structural paint, combined with the fact *that under many circumstances it is devoid of value as a rustless coating*.





*Piney Creek Trestle, Tennessee Central Railway.*



*P. & L. E. R. R. Power House, Pittsburg, Pa.*



## OXIDE PAINTS

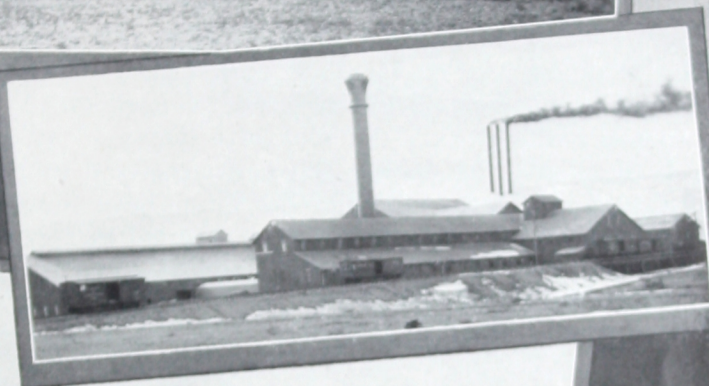
**O**XIDE OF IRON has been in use as a pigment in paints and coatings for the protection of iron and steel structures for many years, but under many circumstances has failed to lend that protection desired. The cheapness of the material and brilliancy of the color has tended more to its use than the durable qualities of the paint obtained from it. However, "Pure Magnetic" Oxide of Iron, containing ninety-five per cent Sesqui-Oxide of Iron, prepared in chemically refined Linseed Oil, gives a most valuable metal covering when price is considered. Owing to the crystallization of Oxide of Iron, the first object of a good pigment is defeated, namely: it attacks the life of the oil. Oxide of Iron does not combine with Linseed Oil at all, the process of drying depending alone on the absorption of oxygen by the oil, in which the pigment assists in a purely mechanical way. One writer on the subject of Oxide of Iron as a pigment for metal coatings, goes so far as to pronounce Oxide of Iron, after the most careful investigation, to be actually dangerous for the purpose of protection of structural work. In this we do not altogether coincide, for our experience of twenty years teaches us differently. At the same time it is a fact that ninety-five per cent of the Oxide of Iron paints are really injurious owing to the contaminations in the native Oxide or adulterations used by paint makers. We are safe in saying that two-thirds of the Oxide of Iron paints now on the market contain over five per cent of Carbonate of Lime; and it has been clearly demonstrated that any paint containing over five per cent of Carbonate of Lime is freely attacked by sulphur generated by combustion of coal or other causes, and the paint or coating rapidly becomes disintegrated.

It is therefore conclusive that a pigment used in the composition of a rustless coating should not contain more than five per cent of Carbonate of Lime. This is a point which is almost imperative in the make-up of true protective paint. The bright, clear color of many of our Oxide of Iron pigments has doubtless added much to the preference for Oxide of Iron as a structural paint, but our experience has been almost invariably that the brighter the color the less durable the paint.

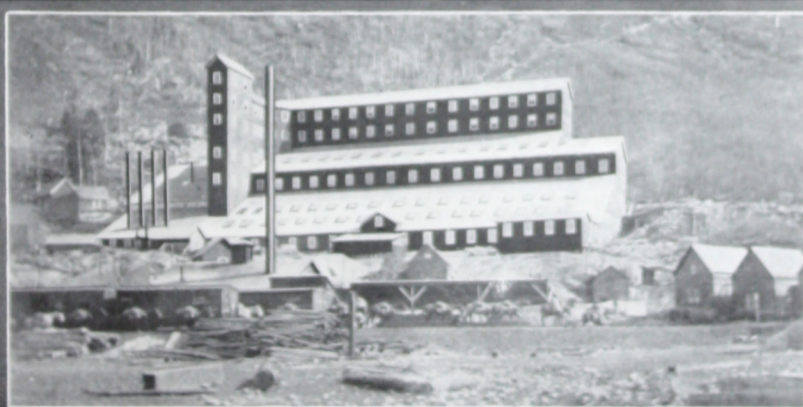
One other noticeable feature of Oxide of Iron is, that the higher the percentage of Sesqui-Oxide of Iron contained in the Oxide the slower the paint is in drying. This is one objection to Oxide of Iron as a pigment, for we know that the Oxide of Iron must contain a high percentage of Sesqui-Oxide to give protection, and we also know that a good structural paint should not contain any Liquid Dryer, Benzine or Turpentine.

Oxide of Iron paints give very short protection to iron or steel in the presence of sea water. The salts contained therein have a most pronounced effect upon the pigment, in many cases and under certain circumstances tending to make the metal more susceptible to rust. This fact is clearly demonstrated to the skeptical in the holds of many steel vessels where the paint is exposed to a confined atmosphere, and the chemical changes of bilgewater in the lower section of the hold, combined with more or less drainage from the ash boxes of the furnaces and coal bunkers in steam vessels, (not to speak of the leakage from various cargoes) often emit gases which are prone to kill the life of ordinary Oxide of Iron paint. And much the same thing takes place on our elevated railroads, where locomotive smoke and drainage from the engines containing sulphur, etc., are washed by rain over the surface painted with ordinary Oxide of Iron paint; the life of which, when under those circumstances, is very short.





United States Reduction and Refining Co's Plants, Florence, Colo.



Smuggler-Union Mining Co's Plant, Telluride, Colo.

These plants are protected by Carbonizing Coating from rust and corrosion.



## GRAPHITE PAINTS.

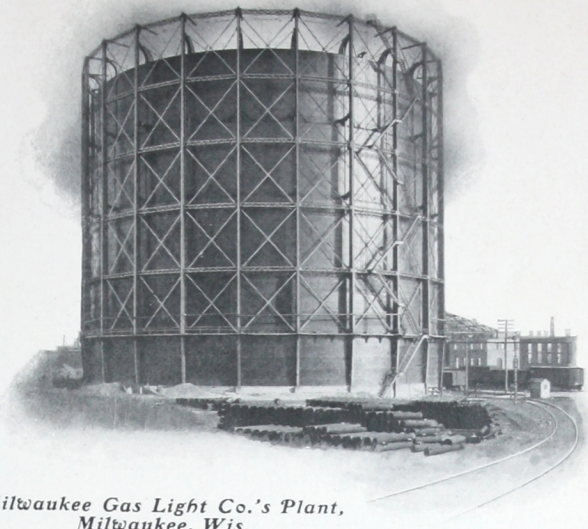
GRAPHITE AS A PIGMENT has come into use within recent years quite extensively as a protecting pigment for iron and steel from rust. The results obtained from Graphite paints have been anything but uniform. The various brands of Graphite give entirely different results. It is claimed that the deposit of Graphite recently discovered in a section of Canada is the best, while those mining Graphite in Mexico, Ceylon and various sections of the United States, each and all claim superiority over one another; therefore we do not wonder at the varying results obtained, as the pigment, according to the miners, varies so much in quality. The ideas advanced by some that Graphite, when in conjunction with Linseed Oil, so arranges itself on the surface of the metal like so many shingles on the roof of a house or the scales upon a fish, is so ridiculous that we hardly think it necessary to prove scientifically the absurdity of the idea. Graphite has never been found in a perfect state of purity, and could not in its pure state be used as a protective paint. While the pigment Graphite itself is not attacked by acids, alkalies or brine, the oil in the paint is, consequently, a disintegration of the coating when exposed to the action of sulphur, etc.

*It is well to remember that whatever pigment is used in a protective coating, let it be Graphite, Red Lead, or any other ordinary paint pigment, that each and every molecule of the pigment is surrounded by the oil or binding medium and (the pigment) does not come in contact with the metal at all.*

One of the most objectionable features of Graphite paint is that it dries too soft and spongy. Especially is this objectionable when used on railroad bridges, depots, etc., where the surface coated is exposed to flying particles from fast running locomotives and sand blasts, which puncture the paint and lay the surface bare to deleterious agents. Many claim Graphite paint to be much more elastic than any other paint. That may be so, but as there is a limit to the brittleness of a coating, so there must be to the elasticity. Examine under a microscope Graphite paint mixed with Linseed Oil, and it will divulge many of the objectionable features of this paint.

Graphite has *positively no affinity* for Linseed Oil, therefore the many claims made for it are made for the *pigment Graphite*, and not for the mixture of Graphite and Linseed Oil, known as Graphite paint. The assertion also, that Graphite remains elastic to the last is in our mind erroneous; and to this we say, we have made thousands of gallons of Graphite paint, but when exposed side by side with other paints to the rays of the sun, it loses as great a percentage of its elasticity as any other structural iron paint. Graphite paints frequently show an unbroken coating on the metal, but, lacking in moisture-repelling qualities, underneath the film of paint rust and corrosion have been going on just the same.

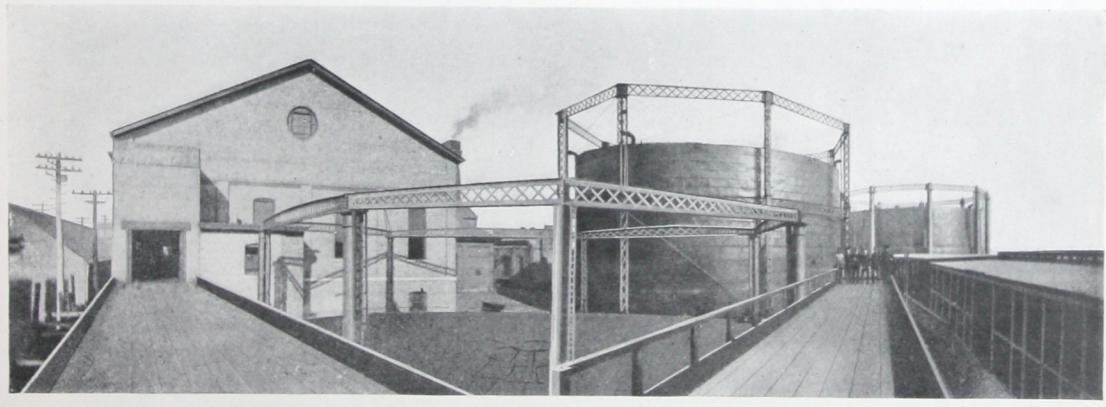




*Milwaukee Gas Light Co.'s Plant,  
Milwaukee, Wis.*



*Allegheny Gas Plant, Allegheny, Pa.*



*People's Gas and Electric Co.'s Plant, Peoria, Illinois.*

Carbonizing Coating does successfully protect the Iron and Steel work  
of Gas Producing Plants.



## CARBONIZING COATING.

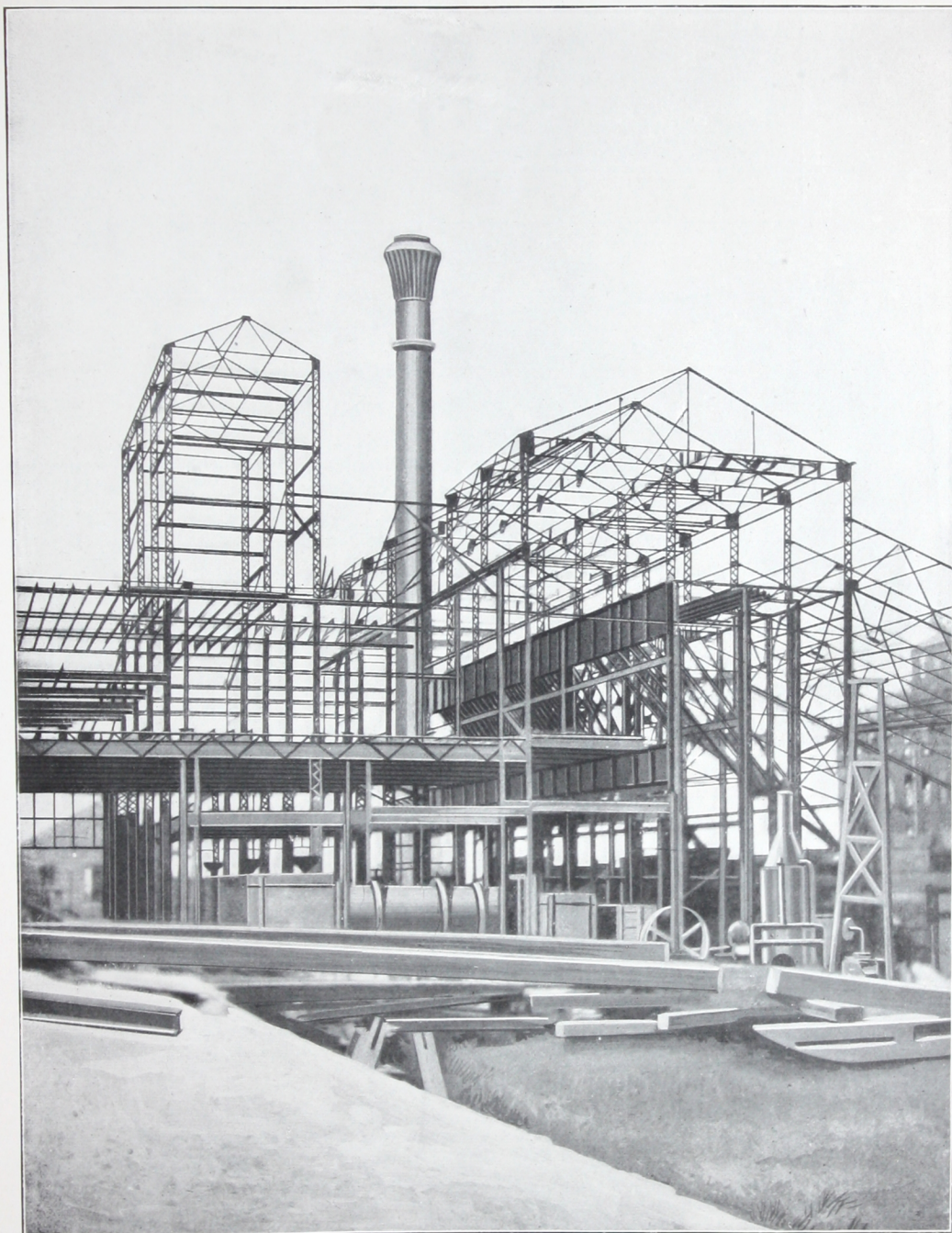
CARBONIZING COATING can hardly be classed with paints; it is something more. It has given protection where ordinary good paint has completely failed. Why? Because it is made of chemically pure materials, and manipulated in such a manner that uniform and reliable results are obtained. The vehicle is chemically pure Linseed Oil, with which are combined time-tried staple pigments; the combination cannot be other than durable.

*Carbonizing Coating* is made for one purpose only, viz, the protection of Iron and Steel from Rust and Corrosion. It is adhesive, and completely seals the metal from moisture and other oxidizing influences. It is not a new "patented" product, but one that has been in use for years, demonstrating its value as a protective paint.

We invite your attention to the endorsements contained in this pamphlet, and the universal satisfaction it has given on all characters of work.

Carbonizing Coating is the quintessence of economical protection; it costs no more than ordinary good paint per square foot covered, and affords protection to Iron and Steel which is more reliable, and more durable, than afforded by ordinary paints; such as Graphite, Red Lead, Iron Oxide or mixtures of the same.





A mill building in course of erection, upon which  
Carbonizing Coating was used.



*University of Notre Dame.*

NOTRE DAME, IND., MARCH 3, 1900.

*The Goheen Mfg. Co., Canton, Ohio.*

GENTLEMEN:—In reply to your favor of the 1st inst., I would state that Carbonizing Coating has given me entire satisfaction. I have used it on roofs that had been painted before with mineral paint, and only applied one coat, as I did not consider it necessary to give it two coats. It is the best paint for the purpose I have used in the last thirty-five years. I shall send for more as soon as work can be done outside, and shall do away with all other mineral paints, as they are too expensive to use.

Yours truly,

BRO. FREDERICK.

A. J. TULLOCK, C. E. } ENGINEERS  
E. H. CONNOR, C. E. }  
M. A. WALDO, C. E. }  
ENGR. OF CONSTRUCTION

**A. J. Tullock, Proprietor,**

*Missouri Valley Bridge and Iron Works,*

ENGINEERS, MANUFACTURERS AND BUILDERS OF

STEEL AND IRON BRIDGES, GIRDERS, VIADUCTS, TURNTABLES, TRESTLES, ROOFS, STEEL WATER TANKS AND BUILDINGS, SUBSTRUCTURES, PNEUMATIC PRESS, DEEP FOUNDATIONS, ETC.

A. J. SCHILLING, SECRETARY  
J. W. YOUNG, } AGENTS  
ALBERT ROHR, }

ADDRESS  
ALL CORRESPONDENCE TO  
A. J. TULLOCK, PROPRIETOR.

*The Goheen Mfg. Co., Canton, Ohio.*

LEAVENWORTH, KAS., OCT. 26, 1901.

GENTLEMEN:—It affords me pleasure to state that I have used your paint, known as Carbonizing Coating, on our Fourteenth Street Viaduct at Denver, Colorado, and found it very satisfactory in every respect; in fact, I was exceptionally well pleased with it, both on account of the merits of the paint and on account of the fact that it was more economical than many of the other high-grade paints, by reason of its greater spreading power.

Very truly yours,

A. J. TULLOCK, Proprietor.

*Union Club.*

VICTORIA, B. C., JAN. 15, 1898.

*The Goheen Mfg. Co., Canton, Ohio.*

DEAR SIR:—I have submitted a sample of your "Carbonizing Coating" to the Government analyst for the purpose of testing with various acids, etc., and he informs me as follows, viz:

1. Strong Ammonia has practically no effect.
2. Caustic Soda is destructive to the Coating.
3. Strong Nitric Acid has but little effect.
4. Strong Hydrochloric Acid does not affect the paint except when there is a flaw, when it spreads beneath and the Coating easily rubs off.
5. Concentrated Sulphuric Acid attacks the Coating.
6. Sulphuric Acid or Sulphur Fumes have no effect.
7. Fuming Nitric Acid practically the same as Hydrochloric.

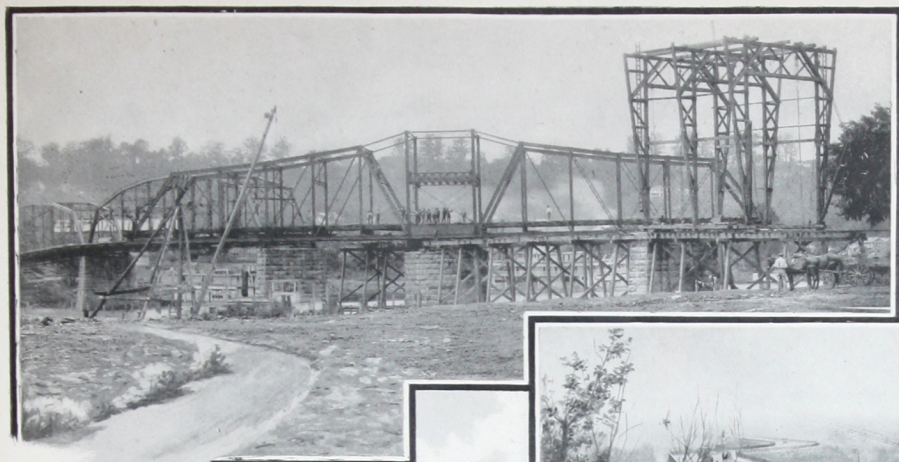
The liquid acids, *all very strong*, were placed on the plate and after 14 days were washed off.

I am now subjecting a sample you were good enough to send me, to the action of sea water. I am, dear sirs,

Yours faithfully,

EDWARD MOHUN, C. E.

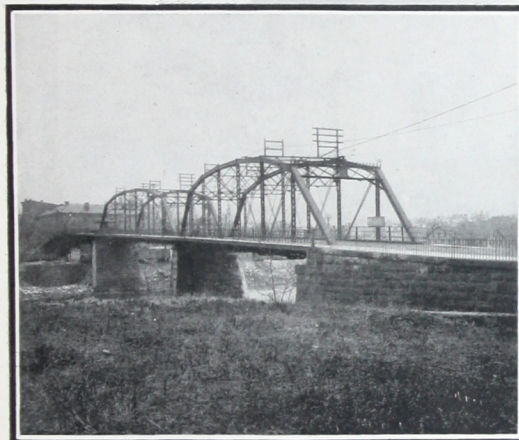




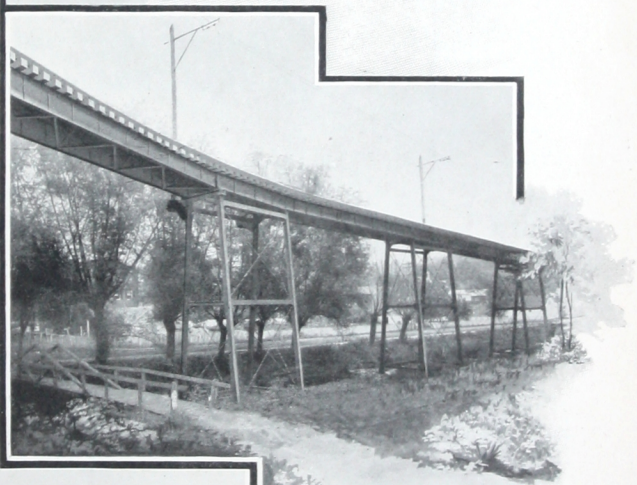
*Bridge Over the Muskingum River  
at Marietta, Ohio.*



*Fourteenth Street Viaduct, Denver, Colo.*



*Bridge at Connelville, Pa.*



*Bridge at Mt. Washington, Md.*



*Union Traction Co.'s Bridge,  
near Baltimore, Md.*



Messrs. S. E. Darby & Co., 424 Mining Exchange Building, Denver, Col.

*The Globe Smelting and Refining Company.*

DENVER, COL., JUNE 24, 1898.

GENTLEMEN:—As the writer has for a number of years been very much interested in the various paints used for industrial purposes containing carbon in various admixtures and forms, we procured a small sample of your Carbonizing Coating and made a practical test of same upon our No. 4 blast furnace down-take pipe. This paint was put side by side with two other paints, which we do not deem it pertinent to mention in this connection. We were very much surprised to note that your paint was not affected, whilst other paints were completely burnt off during the operation termed "blowing out" the furnace. We have since this time placed with you two orders of one barrel each, and further experience with your paint is of such a character as to call for it in a certain roasting furnace building, now in the course of construction. In this specification we stated that the contractor must paint *all* iron work and machinery, such as columns, beams, cylinders, gearing, sole plates, etc., with two good coats of Carbonizing Coating, manufactured by The Goheen Manufacturing Company, of Canton, Ohio. In our specifications, under the heading "Building," we stated as follows:

"Paint all constructional and corrugated iron one good coat of the same paint. The corrugated iron will be painted the factory; after it is erected paint all iron one good coat of the same paint. The corrugated iron will be painted one coat on the under side before being put on, making two coats in all for the underside and outside."

We trust the above unsolicited communication will be of some service to you, as it is always a pleasure to us to commend an article so exceedingly meritorious.

Yours very truly,

THE GLOBE SMELTING AND REFINING COMPANY.  
MALVERN W. ILES, Superintendent.

**J. B. Marsh, Engineer,**

*Designs, Plans and Specifications  
for Metal Structures and Foundations.*

615 Walnut Street,

DES MOINES, IA., FEB. 18, 1899.

*The Goheen Mfg. Co., Canton, Ohio.*

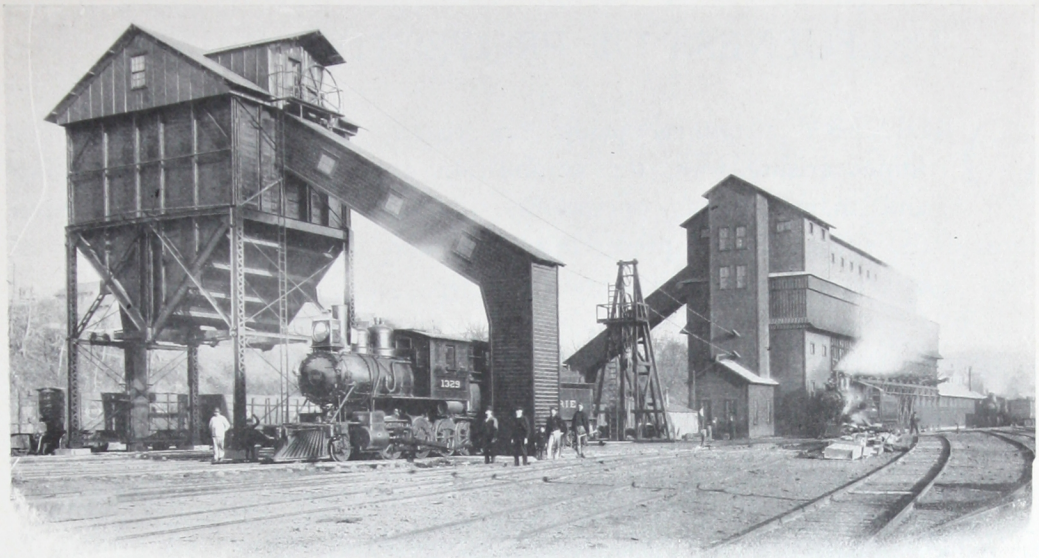
DEAR SIR:—Yours of the 15th inst., noted. Will say that have specified your "Carbonizing Coating" on two bridges of considerable importance that I designed the past year, and believe it to be an excellent protection against rust or corrosion.

The bridges contemplated for this city may not be built this year. However, there will be considerable paint used on structures now standing. Kindly send some samples of your Coating.

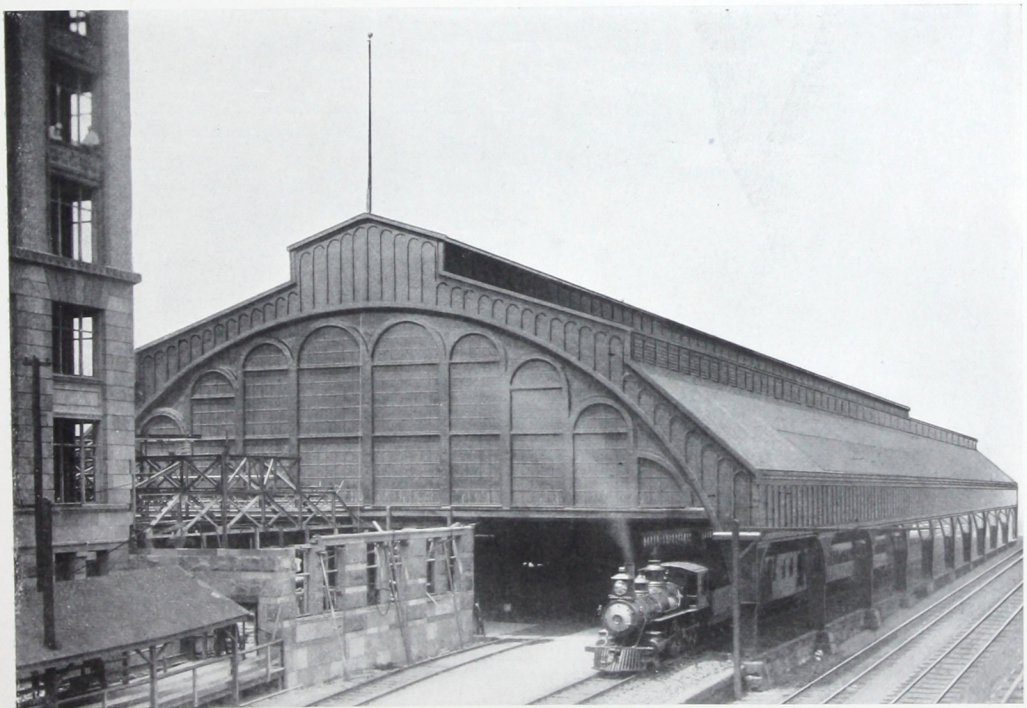
Yours truly,

J. B. MARSH.





*Locomotive Coal and Ashes Station, Erie Railroad, Port Jervis, N. Y.*



*Pittsburg & Lake Erie Railroad Depot, Pittsburg, Pa.*

Carbonizing Coating has proved its efficiency on Railroad work,  
Protecting Iron and Steel from Rust and Corrosion.



# ACIDS, SULPHUR AND GASES SHORTEN THE USEFULNESS OF PROTECTIVE PAINTS.

ORDINARY structural paints are readily disintegrated by sulphur fumes arising from the combustion of coal in railroad, smelting and manufacturing operations. "Carbonizing Coating" has been particularly successful in preserving Iron and Steel in the presence of acids, gases and other detrimental agencies.

J. A. ATWOOD,  
CHIEF ENGINEER.

**The Pittsburg & Lake Erie Railroad Co.**  
Pittsburg, Pa.

G. H. SOLES,  
MASTER CARPENTER.

JUNE 19TH, 1900.

The Goheen Mfg. Co., Canton, Ohio.

GENTLEMEN:—I have used several barrels of your Carbonizing Coating on iron and steel bridges, and I firmly believe that it is the best paint on the market for the protection of iron and steel.

I had a piece of sheet iron painted with one coat of Carbonizing Coating and hung up in our Round House on February 7th, 1899, where it would be subject to the fumes and gases from engines. On May 16th, 1900, I had it taken down and found it in almost as good condition as when put up.

Since making this test, I can cheerfully recommend Carbonizing Coating to any parties wishing a first-class paint.

Yours truly,

G. H. SOLES, Master Carpenter.

**The Canton Rolling Mill Co.**

OFFICES: 66 MAIDEN LANE, NEW YORK; 511 NORTHERN BLDG., CHICAGO.  
CANTON, OHIO, AUG. 14, 1899.

The Goheen Mfg. Co., Canton, Ohio.

GENTLEMEN:—In addition to our buildings being painted with your Carbonizing Coating we have our acid tank painted with it. After being exposed to the weather and acid for two years, upon examination we find it just as good as the day it was put on. In my opinion you cannot recommend it too highly for work of this kind.

Yours respectfully,  
E. E. CLINE, Supt.

**Salem Wire Nail Co.**

SALEM, OHIO, NOV. 11, 1897.

The Goheen Mfg. Co., Canton, Ohio.

GENTLEMEN:—Replying to your letter of the 10th inst., we have found the paint answered the purpose and seems to stand the hot copperas solution very well. \* \* \*

Yours truly,

SALEM WIRE NAIL CO.,  
H. H. Sharp.

**Floyd Davis, E. M., Ph. D.**

ANALYTICAL AND CONSULTING CHEMIST.

DES MOINES, IOWA, MAY 9, 1898.

The Goheen Mfg. Co., Canton, Ohio.

DEAR SIR:—I have completed a careful series of experiments on Carbonizing Coating, Graphite paint and Red Lead paint to determine their comparative merits for use in iron and steel structural work. My results can be summed up as follows:

First. Carbonizing Coating has much greater adhesion to iron and steel than either Graphite or Red Lead paint.

Second. Sudden changes of temperature caused both the Graphite and Red Lead paint to crack and show minute spots of separation from the steel, but the Carbonizing Coating after being thus treated had no indication of cracking, and remained as firmly on the steel as before it was heated.

Third. Before being heated, all the paints were impervious to water, but after they had been injured the Graphite and the Red Lead paint allowed water to penetrate and to corrode the steel; but the sample painted with Carbonizing Coating remained perfectly impervious to water and other liquids.

Fourth. All three paints seem about equally affected with alkalies, but the Carbonizing Coating and Graphite paint were apparently unaffected with strong sulphur and acid fumes. They were also unaffected with sulphurated hydrogen fumes, but the Red Lead was slowly destroyed by the former and changed in color by the latter, so that the paint lost its preserving power and could be quite easily removed from the steel.

These experiments show that Carbonizing Coating is an excellent covering for bridges and other exposed structures, and is a perfect protection against the atmospheric agencies, changes of temperature, acid mine waters, corroding gases from smelters, and other destructive agencies that shorten the life of steel and iron structures. It is certainly superior to Graphite and Red Lead paints, and has a greater adhesion for steel than other paints that are used. When I consider its remarkable power to withstand destructive agencies, I appreciate fully its value as a coating for all bridges and other expensive structures connected with railroads.

Very truly yours,

FLOYD DAVIS.

**The National Starch Mfg. Co.**  
(FACTORY OFFICE.)

PAUL H. GRIMM, SUPT.

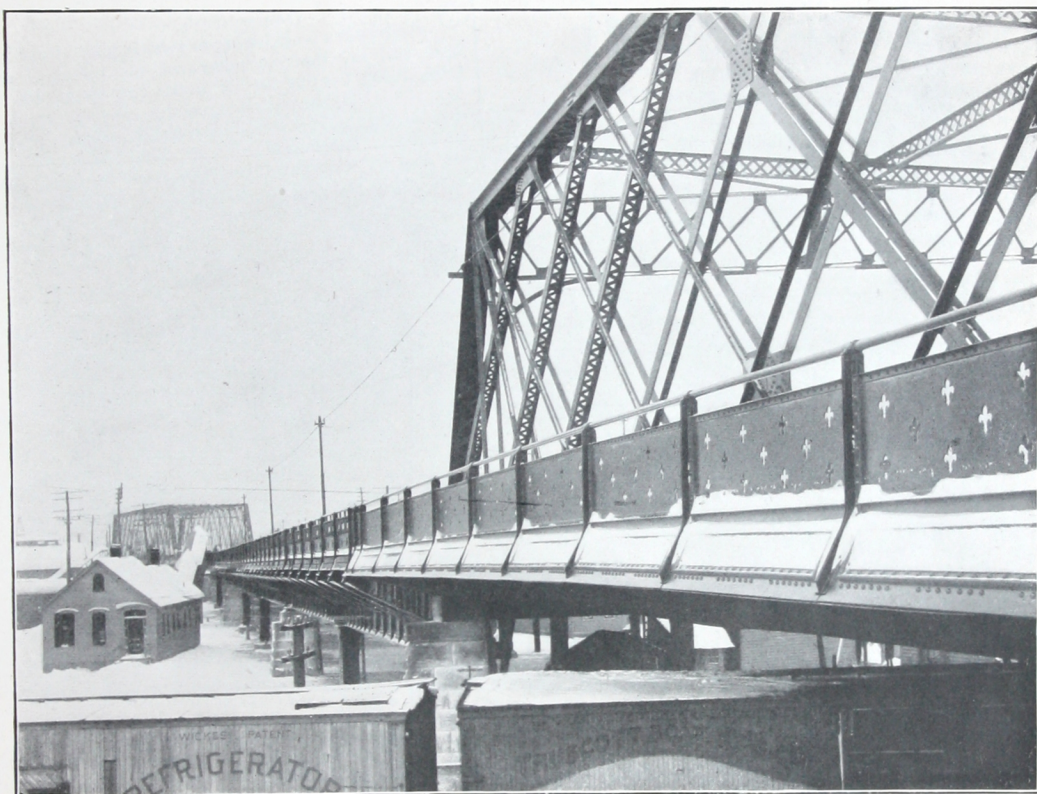
GLEN COVE, L. I., DEC. 14, 1900.

The Goheen Mfg. Co., Canton, Ohio.

GENTLEMEN:—We have your letter of Dec. 8th, making inquiry in regard to Carbonizing Coating, which you have furnished us from time to time in the past. We can say that it is the only paint that we have ever found which will answer the purpose to which it is put. We can recommend it to any one who has use for a material which is required to stand acid fumes. Carbonizing Coating will do this.

Very truly yours,  
THE NATIONAL STARCH MFG. CO.,  
P. H. GRIMM, Superintendent.





*Steel Viaduct, Buffalo, N. Y.*

Carbonizing Coating protects Iron and Steel from the effects of locomotive smoke, steam, gas, etc.



# THE COVERING CAPACITY OF CARBONIZING COATING.

**W**E GUARANTEE that with ordinary labor and ordinary brushes, one gallon of Carbonizing Coating will cover 1,000 square feet of clean metal surface, one coat. The following is the experience of others:

## *The Muskingum Valley Steel Co.*

ZANESVILLE, OHIO, OCT. 23, 1902.

*The Goheen Mfg. Co., Canton, Ohio.*

GENTLEMEN:—We are in due receipt of your favor of the 10th inst., making inquiry concerning the results obtained from the use of your Carbonizing Coating, and are pleased to advise that the results of our experience have been very satisfactory.

Our recent order for 750 gallons of Carbonizing Coating was specified for a special order approximating 750,000 superficial square feet. We applied a single coat to this entire specification and have 150 gallons of the coating yet in stock. This shows that we were able to cover 1,250 square feet with one gallon of paint on an average, which result we think is very satisfactory.

Respectfully,

THE MUSKINGUM VALLEY STEEL CO.  
LESTER WALKER, Sec'y and Treas.

## *National Smelting Co.*

RAPID CITY, S. D., FEB. 21, 1902.

*The Goheen Mfg. Co., Canton, Ohio.*

GENTLEMEN:—Replying to your inquiry of the 18th inst. will say that we purchased one barrel of your Carbonizing Coating for use on our two stacks, 10 x 150 feet and 4½ x 82 feet. Its covering capacity has been so great, that, if it is equally as durable, we have enough on hand to last us for years to come. Our buildings are covered with galvanized iron and we may correspond with you regarding Galvanum at some future date.

Yours very truly,

NATIONAL SMELTING CO.  
C. S. JAMESON,  
Assistant Mgr.

CHAS. L. TUTT, PRESIDENT.  
SPENCER PENROSE, SEC. TREAS.

C. M. MACNEILL, V. PRES. GEN. MANAGER  
J. D. HAWKINS, SUPERINTENDENT.

## *The Standard Milling and Smelting Co.*

WORKS: COLORADO CITY

COLORADO SPRINGS, COLO., APRIL 2, 1901.

*S. E. Darby, Agt., The Goheen Mfg. Co., Mining Exchange Bldg., Denver.*

DEAR SIR:—Some time ago we promised to give you the work performed by The Goheen Manufacturing Company's Carbonizing Coating. We purchased from you in all 1,358 gallons and used in painting 1,323 gallons. We painted 3,863 squares of corrugated iron, three coats; two on one side and one on the other. This gives a covering quality of 876 square feet of iron per gallon of paint, which figures 97½ per cent of the covering capacity guaranteed by the Goheen Manufacturing Company.

Yours very truly,

THE STANDARD MILLING AND SMELTING CO.

By J. D. HAWKINS, Superintendent.

## *Central Lead Co.*

FLAT RIVER, MO., AUG. 19, 1897.

*Messrs. Garrells & Freeman,  
No. 3 Franklin Bank Bldg., St. Louis, Mo.*

GENTLEMEN:—In compliance with your request to state my experience with Carbonizing Coating purchased of you, I am glad to say that I am highly pleased with it. As regards its covering capacity, I found that I was able to put an excellent coat on 1,500 sq. ft. of new corrugated iron, making the cost only ten cents per square. I was able to cover between 300 and 400 square feet of corrugated iron with red mineral paint costing fifty cents per gallon, making at best 12½ cents per square. With half a gallon of Carbonized Coating I gave a good coat to 400 feet of 8-inch spiral riveted pipe. The covering was continuous, and after six months of exposure to the moisture and heat of a mining shaft shows no sign of rust coming on.

Yours truly,

R. D. O. JOHNSON, Supt.

## *Jones & Laughlin, Limited.*

(AMERICAN IRON & STEEL WORKS) PITTSBURG, PA., DEC. 7, 1897.

STRUCTURAL DEPARTMENT.

*W. H. Woodcock, Esq., Inspecting Engineer.*

DEAR SIR:—In replying to your letter of Dec. 4th, referring to Goheen Carbonizing Coating, would say that we have used one barrel exclusively on two buildings erected in the mill. I find the covering quality remarkable. \* \* \* The whole barrel covered two buildings as noted above. The exact weight I am unable to give you, but the details are approximately as follows: 20 to 25 columns with trusses, beams, purlins, laterals, girders and bracing to match; the paint going twice as far as Graphite. I found also that the coating dried quickly and seemed to enter the surface of the steel well, presenting (if painted properly) a smooth, even coat.

Very sincerely,

Geo. F. BAINBRIDGE.

## *The Thompson Mfg. Co.*

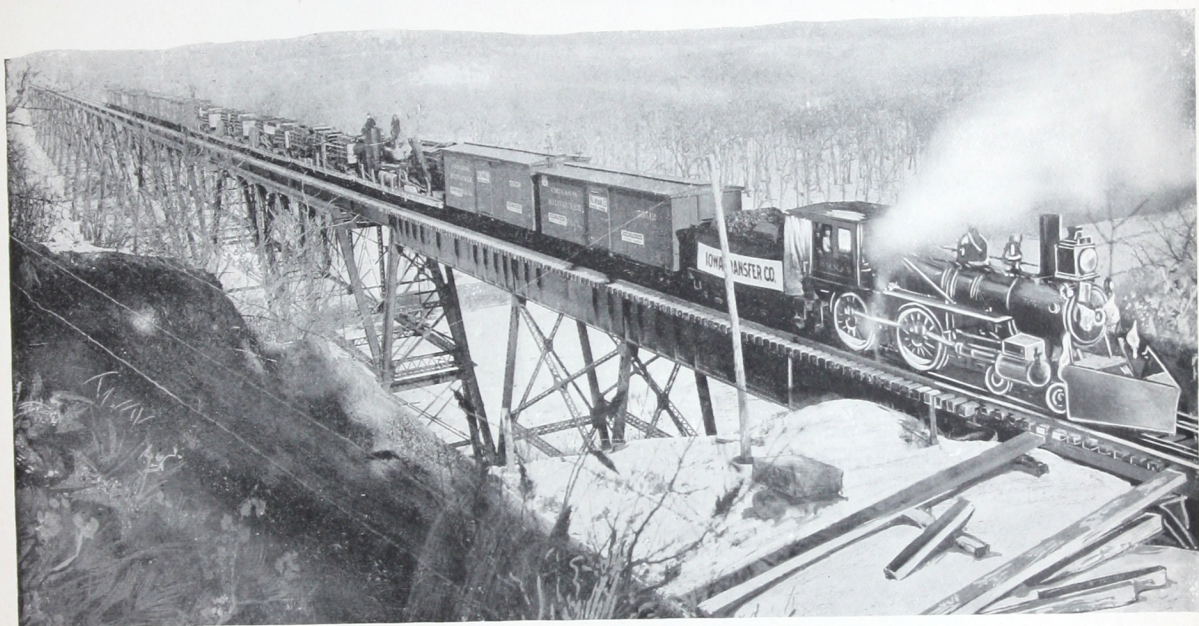
CLEVELAND, OHIO, SEPT. 27, 1897.

*The Goheen Mfg. Co., Canton, Ohio.*

GENTLEMEN:—We had occasion to use some of your Carbonizing Coating during July, 1897. You stated one gallon would cover at least 1,000 square feet. We painted 23,800 square feet steel roofing and used 19 gallons of the coating, which would average about 1,250 square feet to the gallon. Yours truly,

THOMPSON MFG. CO.  
By C. N. THOMPSON.





*High Bridge on Chicago, Milwaukee & St. Paul Railroad.*

Protected by two coats Carbonizing Coating.



## SATISFACTORY RESULTS ALWAYS OBTAINED FROM CARBONIZING COATING.

### *The Arizona Copper Company, Limited.*

CLIFTON, ARIZ., MARCH 12, 1901.

*The Goheen Mfg. Co., Canton, Ohio.*

DEAR SIR:—We are in receipt of your favor of the 7th inst., and in reply thereto would state that we do not convey water from our mines, but we have used your Carbonizing Coating, and in every instance it has given perfect satisfaction.

Yours truly,

JAMES COLQUHOUN,  
General Manager.

### OFFICE OF *Valley Electric Company.*

NEW BRIGHTON, PA., MARCH 15, 1901.

*The Goheen Mfg. Co., Canton, Ohio.*

GENTLEMEN:—Your letter of the 5th to the Penn Bridge Co., of Beaver Falls, was referred to us. They furnished the steel work for our plant, and it was painted with your "Carbonizing Coating." We also have two water turbines and about forty feet of nine-foot casing supplying each turbine with water from a race. These turbines and casings were also painted with your "Carbonizing Coating," and we wish to say it has proved very satisfactory. It has been about two years now since we started up, and the Coating was put on about a year previous to our starting; and since we started water has been in the casing and turbines nearly continuously since that time; besides, the turbines are run from 12 to 15 hours each day, which draws a considerable amount of water through the casings. The last time the writer was in the turbines and casings, which was about a month ago, there was no sign of the "Carbonizing Coating" peeling or flaking off at all. The whole interior appeared to be in as good shape and as evenly covered as the day it was put on, and we wish to say that the water in our river during low water is very hard on boilers, etc., on account of the salts and acids in the water, which principally come from the tin plate mill at New Castle, Pa. The outside of casing, which is exposed to all kinds of weather, has stood equally as well.

Very truly,

VALLEY ELECTRIC COMPANY,  
C. A. WHITE, Supt.

### *The Iowa Gold Mining and Milling Company.*

(IOWA-TIGER CONSOLIDATED MINES.)

SILVERTON, COLORADO.

*The Goheen Mfg. Co., Canton, Ohio.*

GENTLEMEN:—We have your favor of the 7th inst. We have used your "Carbonizing Coating" on wrought iron water and steam pipes, both above and below ground, and have found it very satisfactory.

Yours truly,

E. P. WATSON,  
Acting Manager.





*Piney Creek Trestle, Near Rockwood, Tenn.  
Tennessee Central Railroad.*

Erected by The Carnegie Steel Company.

Protected by three coats Carbonizing Coating.



Mr. Chas. P. Kahler, C. E., Baltimore, Md.

BALTIMORE, MD., JAN. 4, 1898.

DEAR SIR:—In reply to your inquiry regarding my experience with Carbonizing Coating, will say that after satisfying myself as to its merits I have specified its use on considerable of my work with most gratifying results, and take pleasure in recommending it as a protective coating for iron and steel.

Yours truly,

D. B. BANKS, Consulting Engineer.

**Krajewski-Pesant Co.**

NEW YORK, OCT. 15, 1902.

The Goheen Mfg. Co., Canton, Ohio.

DEAR SIR:—We have been referred to you by the Riter-Conley Manufacturing Co., who tell us that they are satisfied with the paint you have furnished them for their iron structures. We would like to try this paint on our Steel Dry Dock in Havana, in order to ascertain if it would give better results than the many kinds of American and European paints which we have tried. This paint must therefore be proof against salt air and tropical heat. At what price could you furnish us this paint? and instruct us also how to mix same.

Very truly yours,

KRAJEWSKI-PESANT CO.

GEORGETOWN, OHIO, NOV. 20, 1902.

The Goheen Mfg. Co., Canton, Ohio.

GENTLEMEN:—In regard to the lasting qualities of Carbonizing Coating, some eight years ago while I was County Engineer for Brown County, Ohio, you sent, for the use of the County, one gallon of your Carbonizing Coating, which was used on a small iron bridge. The paint on the bridge looks and is considerably better today than most paint that has been in use only one year.

Carbonizing Coating is the cheapest paint that can be used on bridge construction, where fumes and smoke from coal come in contact with the metal.

Yours truly,

C. M. GORDON, Engineer.

OFFICE OF

**F. L. Currie, C. E.**

The Goheen Mfg. Co., Canton, Ohio.

TOWNSEND, MONTANA, DEC. 10th, 1900.

GENTLEMEN:—The County Commissioners have awarded a Steel Highway Bridge, 300 feet, to a Mr. C. E. H. Campbell, of Council Bluffs, Iowa. The specifications called for no particular kind or brand of paint. On being asked for an opinion as to quality, he said "I always use *Carbonizing Coating*." That settled it.

Yours truly,

FRANK L. CURRIE,  
County Surveyor.







